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FRANK C. NICHOLAS (33,983)
Name of Appellant, assignee or registered representative

Signature

July 6, 2004
Date of Signature

PATENT
Case No. PHF 99,598
(7790/322)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re patent application of:

RAUL BRUZZONE

Serial No.: 09/551,816

Filed: APRIL 18, 2000

For: CONTROL OF MULTIDIRECTIONAL ANTENNA STRUCTURE IN A PRIMARY STATION FOR USE IN A RADIO COMMUNICATION NETWORK

Examiner: FERRIS, DERRICK W.

Group Art Unit: 2663

APPEAL BRIEF

Mail Stop **Appeal Brief - Patents**
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Appellant herewith respectfully presents its Brief on Appeal as follows:

1. REAL PARTY IN INTEREST

The real party in interest is the assignee, U.S. Philips Corporation, a Delaware Corporation. Koninklijke Philips Electronics N.V., a corporation of the Netherlands, is the ultimate parent of U.S. Philips Corporation.

2. RELATED APPEALS AND INTERFERENCES

Appellant and the undersigned attorney are not aware of any other appeals or interferences which will directly affect or be directly affected by or having a bearing on the Board's decision in the pending appeal.

3. STATUS OF CLAIMS

Claims 1-6 have been cancelled. Claims 7-18 are currently pending in the application and are the claims on appeal. See, the Appendix. Claims 7-18 stand finally rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,100,843 to *Proctor, Jr.* et al. in view of U.S. Patent No. 5,123,112 to *Choate*.

4. STATUS OF AMENDMENTS

A reply under 37 C.F.R. §1.112 involving a cancellation of claims 1-6 and an addition of claims 7-18 filed on 12/23/2003, and entered into the present application by Examiner Ferris. A reply under 37 C.F.R. §1.116 involving arguments supporting an allowance of claims 7-18 over *Proctor* in view of *Choate* was filed on 04/02/2004, but was deemed by Ferris as not placing the present application in condition for allowance.

5. SUMMARY OF THE INVENTION

The present invention provides a generic method for controlling a multi-directional controllable antenna structure 9 (FIG. 2) in a primary radio station 4 (FIG. 1) intended to communicate with a plurality of secondary station 1 (FIG. 2) of a radio communication network.

A first stage 100 (FIG. 3) of the method involves an acquisition of data relating to the secondary stations 1 from at least one radio signal received by multi-directional controllable antenna structure 9. See, *U S Patent Application Serial No. 09/551,816* on page 4, lines 12 and 13.

A second stage 120, 130 and 150 (FIG. 3) of the method involves conditionally selecting an active secondary station 1 and alternative secondary stations 1 suitable for becoming active. See, *U.S. Patent Application Serial No. 09/551,816* on page 4, lines 13-22 and 26-31. In one embodiment, the selection of the active secondary station 1 is based on quality data associated with a pairing of each secondary station 1 to one of the directional antennas A(1)-A(6) (FIG. 2)

of multi-directional controllable antenna structure 9. See, *U.S. Patent Application Serial No. 09/551,816* on page 5, line 23 to page 6, line 7. In a second embodiment, the selection of the active secondary station 1 is based on quality data associated with a predefined state of multi-directional controllable antenna structure 9. See, *U.S. Patent Application Serial No 09/551,816* on page 6, lines 8-15.

A third stage 140 and 160 (FIG. 3) of the method involves a calculation of directions of signals received from the selected secondary stations 1. See, *U.S. Patent Application Serial No. 09/551,816* on page 4, lines 22-26 and lines 32 and 33. In one embodiment, the calculation stage involves a calculation of a heading of a selected secondary station in a local coordinate system attached to primary station 4, which is followed by a conversion of the calculated heading in the local coordinate system of primary station 4 to a heading in a coordinate system attached to the Earth. See, *U.S. Patent Application Serial No. 09/551,816* on page 6, line 28 to page 14, line 9.

A fourth stage 170 (FIG. 3) of the method involves a storage the calculated directions and a controlling of the multi-directional controllable antenna structure 9 in dependence of the stored directions. See, *U S. Patent Application Serial No. 09/551,816* on page 5, lines 1-6.

A further stage of the method can involve a tracking of a direction of the active secondary station 1 with the multi-directional controllable antenna structure 9. See, *U.S. Patent Application Serial No. 09/551,816* on page 5, lines 7-19.

A specific method for controlling a multi-directional controllable antenna structure 9 in a primary radio station 4 having a CDMA form is illustrated in FIGS. 9-11. See, *U.S. Patent Application Serial No. 09/551,816* on page 14, line 10 to page 17, line 7.

6. ISSUE

Whether claims 7-18 are allowable over *Verzulli*.

7. GROUPING OF CLAIMS

Claims 7-18 should be considered in three (3) groups.

Claim group I includes independent claims 7, 10, 13 and 16, which are directed to a genus claims for controlling a multi-directional controllable antenna structure in a primary radio station intended to communicate with a plurality of secondary stations of a radio communication network.

Claim group II includes dependent claims 8, 11, 14 and 17, which are directed to a further addition to the genus claims of claim group I involving a tracking of a direction of the active secondary station with the multi-directional controllable antenna structure.

Claim group III includes dependent claims 9, 12, 15 and 18, which are species claims directed to the conditional selection of active and alternative secondary stations suitable for being active an encompassed by genus claims of claim group I.

8. ARGUMENTS

Proctor. As illustrated in FIG. 2, *Proctor* teaches an antenna structure 100 for determining in which direction a base station 160 assigned to a subscriber unit is located whereby antenna structure 100 is configured to maximize the effective radiated and/or received energy. To this end, antenna structure 100 employs multiple antennas 101-105 and a like number of adjustable phase shifters 111-115, respectively. Phase shifters 111-115 are independently adjustable (i.e., programmable) to affect the phase of respective reverse link signals to be transmitted from the subscriber unit on each of antennas 101-105.

A summation circuit 120 is also coupled to each phase shifter 111-115 to communicate respective reverse link signals from the subscriber unit to each of the phase shifters 111-115 for transmission from the subscriber unit. Summation circuit 120 also receives and combines the respective forward link signals from each of the phase shifters 111-115 into one received forward link signal provided to the subscriber unit.

Phase shifters 111-115 are also independently adjustable to affect the phase of the forward link signals received at the subscriber unit on each of the antenna 101-105. By adjusting phase for forward link signals, antenna structure100 provides rejection of signals that are received and that are not transmitted from a similar direction as are the forward link signals intended for the subscriber unit.

To allow antenna structure 100 to adapt to various orientations with respect to base station 160, antenna structure 100 also includes a controller 140 coupled to each of the adjustable phase shifters 111-115 to determine an optimal phase setting for each phase shifter 111-115. Antenna structure 100 acts as a beamformer for transmission of signals from the subscriber unit and acts as a directive antenna for signals received by the subscriber unit. See, *Proctor* at column 6, line 1 to column 9, line 60.

FIGS. 6A-6C of *Proctor* illustrate exemplary beam patterns obtained from antenna structure 100 as related to base station 160 being zero (0) degrees East, twenty (20) degrees East, and forty-five (45) degrees East. One objective of *Proctor* in obtaining such beam patterns was to eliminate the risk of multi-fading experienced by single element antennas and dual element antennas. Specifically, single element antennas are highly susceptible to multipath fading due to a failure of a single element antenna to be tuned in any particular direction. This failure results in a need of the single element antenna to scan multiple directions whereby an original version of a signal from a base station and any reflected version of the signal can both be undesirably received by the single element antenna. Dual element antenna are also susceptible to multipath fading due to the symmetrical opposing nature of the hemispherical lobes formed by the antenna pattern of the dual element antenna when the phase shifter is activated. Particularly, the symmetrical opposing nature of the hemispherical lobes can result in any reflected version of a signal in a reverse direction from its origin can be received with as much power as the original version of the signal that is directly received. See, *Proctor* at column 2, lines 25-61.

Obviousness. To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. See, MPEP §2143. The Appellant respectfully traverses the obviousness rejection of claims 7-18, because *Proctor* teaches away from the combination of *Proctor* and *Choate* as asserted by Examiner Ferris by teaching away from the following limitations of independent claims 7, 10, 13 and 16:

1. "acquisition means for acquiring data relating to at least one of said secondary stations from at least one radio signal received by said multi-directional controllable antenna structure", "selection means for, based on the acquired data, conditionally selecting at least an active secondary station and at least an alternative secondary station suitable for becoming active", "calculation means for calculating directions of signals received from the selected secondary stations", "storage means for storing the calculated directions" and "control means for controlling said multi-directional controllable antenna structure in dependence of the stored directions" as recited in independent claims 7 and 13;

2. "acquiring data relating to at least one of said secondary stations from at least one radio signal received by said multi-directional controllable antenna structure", "based on the acquired data, conditionally selecting at least an active secondary station and at least an alternative secondary station suitable for becoming active", "calculating directions of signals received from the selected secondary stations", "storing the calculated directions" and "controlling the multi-directional controllable antenna structure in dependence of the stored directions" as recited in independent claim 10; and

3. "acquire data relating to at least one of said secondary stations from at least one radio signal received by said multi-directional controllable antenna structure", "based on the acquired data, conditionally select at least an active secondary station and at least an alternative secondary station suitable for becoming active", "calculate directions of signals received from the selected secondary stations", "store the calculated directions" and "control the multi-directional controllable antenna structure in dependence of the stored directions" as recited in independent claim 16.

As to the traversal, one of *Proctor*'s objective is to eliminate multi-fading experienced by single element antennas and dual element antennas by having antenna structure 100 act as a beamformer for transmission of signals from the subscriber unit and acts as a directive antenna for signals received by the subscriber unit. The Appellant respectfully asserts that this objective of *Proctor* teaches away from the aforementioned limitations of independent claims 7, 10, 13 and 16, because such limitations re-introduce the risk of multi-fading by antenna structure 100 of *Proctor*.

Specifically, FIG. 6A of *Proctor* teaches a beam pattern of antenna structure 100 directed to zero (0) degrees east. Assuming a base station is located zero (0) degrees East of antenna structure 100 and a second base station was located zero (0) degrees West of antenna structure 100 (i.e. 180 degrees East), *Proctor* would be required by the aforementioned limitations of independent claims 7, 10, 13 and 16 to act as a dual element antenna whereby antenna structure 100 would create symmetrical opposing beam patterns in order to detect both base stations. By creating symmetrical opposing beam patterns, antenna structure 100 is now susceptible to multi-fading in view of the fact that an original version of a signal from the first base station would be received within the zero (0) degrees East beam pattern and a reflected version of the signal from the first base station can be received within the zero (0) degrees West beam pattern. This result is contradictory to the teachings of *Proctor*. In fact, beam patterns having an infinitesimal small beam pattern differential would also be susceptible to multi-fading. Clearly, *Proctor* teaches away from the aforementioned limitations of independent claims 7, 10, 13 and 16,

Withdrawal of the rejection of independent claims 7, 10, 13 and 16 under §103(a) as being unpatentable over *Proctor* in view of *Choate* is therefore respectfully requested.

Claims 8 and 9 depend from independent claim 7. Therefore, dependent claims 8 and 9 include all of the elements and limitations of independent claim 7. It is therefore respectfully submitted by the Applicant that dependent claims 8 and 9 are allowable over *Proctor* in view of *Choate* for at least the same reason as set forth herein with respect to independent claim 7 being allowable over *Proctor* in view of *Choate*. Furthermore, *Proctor* teaches away from the limitation of dependent claim 8 by teaching a periodic update of the phase setting of phase shifters 111-115 during lone idle time periods as opposed to a continual updating of the phase settings of phase shifters 111-115 when actively communicating with a base station. See, *Proctor* at column 8, line 56-60. Additionally, *Proctor* teaches away from the limitations of dependent claim 9 by teaching an acquisition of quality data based on a pre-defined state of antenna structure 100 as opposed to a pairing of a base station and one of the antennas. See, *Proctor* at column 8, lines 14-55; and column 9, lines 5-60.

Withdrawal of the rejection of dependent claims 8 and 9 under 35 U.S.C. §103(a) as being unpatentable over *Proctor* in view of *Choate* is respectfully requested.

Claims 11 and 12 depend from independent claim 10. Therefore, dependent claims 11 and 12 include all of the elements and limitations of independent claim 10. It is therefore respectfully submitted by the Applicant that dependent claims 11 and 12 are allowable over *Proctor* in view of *Choate* for at least the same reason as set forth herein with respect to independent claim 10 being allowable over *Proctor* in view of *Choate*. Furthermore, dependent claim 11 is allowable over *Proctor* in view of *Choate* for at least the same reason as set forth herein with respect to dependent claim 8 being allowable over *Proctor* in view of *Choate*, and dependent claim 12 is allowable over *Proctor* in view of *Choate* for at least the same reason as set forth herein with respect to dependent claim 9 being allowable over *Proctor* in view of *Choate*. Withdrawal of the rejection of dependent claims 11 and 12 under 35 U.S.C. §103(a) as being unpatentable over *Proctor* in view of *Choate* is respectfully requested.

Claims 14 and 15 depend from independent claim 13. Therefore, dependent claims 14 and 15 include all of the elements and limitations of independent claim 13. It is therefore respectfully submitted by the Applicant that dependent claims 14 and 15 are allowable over *Proctor* in view of *Choate* for at least the same reason as set forth herein with respect to independent claim 13 being allowable over *Proctor* in view of *Choate*. Furthermore, dependent claim 14 is allowable over *Proctor* in view of *Choate* for at least the same reason as set forth herein with respect to dependent claim 8 being allowable over *Proctor* in view of *Choate*, and dependent claim 15 is allowable over *Proctor* in view of *Choate* for at least the same reason as

set forth herein with respect to dependent claim 9 being allowable over *Proctor* in view of *Choate*. Withdrawal of the rejection of dependent claims 14 and 15 under 35 U.S.C. §103(a) as being unpatentable over *Proctor* in view of *Choate* is respectfully requested.

Claims 17 and 18 depend from independent claim 16. Therefore, dependent claims 17 and 18 include all of the elements and limitations of independent claim 16. It is therefore respectfully submitted by the Applicant that dependent claims 17 and 18 are allowable over *Proctor* in view of *Choate* for at least the same reason as set forth herein with respect to independent claim 16 being allowable over *Proctor* in view of *Choate*. Furthermore, dependent claim 17 is allowable over *Proctor* in view of *Choate* for at least the same reason as set forth herein with respect to dependent claim 8 being allowable over *Proctor* in view of *Choate*, and dependent claim 18 is allowable over *Proctor* in view of *Choate* for at least the same reason as set forth herein with respect to dependent claim 9 being allowable over *Proctor* in view of

Choate. Withdrawal of the rejection of dependent claims 17 and 18 under 35 U.S.C. §103(a) as being unpatentable over *Proctor* in view of *Choate* is respectfully requested.

Dated: **July 6, 2004**

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APPENDIX

7. A primary radio station for use in a communication system including a plurality of secondary radio stations, said primary station comprising:

a multi-directional controllable antenna structure operable to transmit and receive radio signals;

acquisition means for acquiring data relating to at least one of said secondary stations from at least one radio signal received by said multi-directional controllable antenna structure;

selection means for, based on the acquired data, conditionally selecting at least an active secondary station and at least an alternative secondary station suitable for becoming active;

calculation means for calculating directions of signals received from the selected secondary stations;

storage means for storing the calculated directions; and

control means for controlling said multi-directional controllable antenna structure in dependence of the stored directions.

8. The primary station of claim 7, further comprising:

tracking means for tracking a direction of the active secondary station with said multi-directional controllable antenna structure.

9. The primary station of claim 7,

wherein said multi-directional controllable antenna structure includes a plurality of directional antennas;

wherein the acquired data are quality data associated with at least one secondary station/directional antenna pairing; and

wherein the active secondary station is the secondary station associated with a secondary station/directional antenna pairing having a highest quality data.

10. A method for controlling a multi-directional controllable antenna structure in a primary radio station intended to communicate with a plurality of secondary stations of a radio communication network, said method comprising:

acquiring data relating to at least one of said secondary stations from at least one radio signal received by the multi-directional controllable antenna structure;

based on the acquired data, conditionally selecting at least an active secondary station and at least an alternative secondary station suitable for becoming active;

calculating directions of signals received from the selected secondary stations;

storing the calculated directions; and

controlling the multi-directional controllable antenna structure in dependence of the stored directions.

11. The method of claim 10, further comprising:

tracking a direction of the active secondary station with the multi-directional controllable antenna structure.

12. The method of claim 10,

wherein the multi-directional controllable antenna structure includes a plurality of directional antennas;

wherein the acquired data are quality data associated with at least one secondary station/directional antenna pairing; and

wherein the active secondary station is the secondary station associated with a secondary station/directional antenna pairing having a highest quality data.

13. A radio communication system, comprising:

a plurality of secondary stations; and

a primary radio station including

a multi-directional controllable antenna structure operable to transmit and receive radio signals,

acquisition means for acquiring data relating to at least one of said secondary stations from at least one received radio signal,

selection means for, based on the acquired data, conditionally selecting at least an active secondary station and at least an alternative secondary station suitable for becoming active,

calculation means for calculating directions of signals received from the selected secondary stations,

storage means for storing the calculated directions, and

control means for controlling said antenna structure in dependence of the stored directions.

14. The radio communication network of claim 13, wherein said primary station further includes tracking means for tracking a direction of an active secondary station with said multi-directional controllable antenna structure.

15. The primary station of claim 13,

wherein the multi-directional controllable antenna structure includes a plurality of directional antennas;

wherein the acquired data are quality data associated with at least one secondary station/directional antenna pairing; and

wherein the active secondary station is the secondary station associated with a secondary station/directional antenna pairing having a highest quality data.

16. A computer program for use in a primary radio station having a multi-directional controllable antenna structure and intended to be used in a radio communication network having a plurality of secondary stations, said computer program comprising computer program code means to make the primary radio station:

acquire data relating to at least one of said secondary stations from at least one radio signal received by the multi-directional controllable antenna structure;

based on the acquired data, conditionally select at least an active secondary station and at least an alternative secondary station suitable for becoming active;

calculate directions of signals received from the selected secondary stations;

store the calculated directions; and

control the multi-directional controllable antenna structure in dependence of the stored directions.

17. The computer program of claim 16, wherein said computer program further comprises computer program means to make the primary radio station track a direction of the active secondary station with the multi-directional controllable antenna structure.

18. The computer program of claim 16,

wherein the multi-directional controllable antenna structure includes a plurality of directional antennas;

wherein the acquired data are quality data associated with at least one secondary station/directional antenna pairing; and

wherein the active secondary station is the secondary station associated with a secondary station/directional antenna pairing having a highest quality data.